CLAIMS

1. A polyphase reluctance machine comprising a first and second magnetic circuit assemblies arranged for relatively movement, both assemblies having salient poles, only the poles of the first arrangement carrying windings, the pole widths of the first and second assemblies being substantially equal, wherein each pole of said first assembly is subdivided into plural teeth, the windings for each pole being mounted on each of or on alternate ones of the respective teeth, all windings of the teeth of each pole being connected together to be one phase winding such that, when excited, the phase winding of each pole form electromagnetic poles of the same polarity at each tooth, each wound tooth being arranged in use to generating left and right circular flux loop such that the rotational direction of the flux loop linking to the portions of right or left flux loop of adjacent wound teeth is the same and the linking flux loops joining together as a series of circular flux loops, the arrangement being such that in use, the flux loop where a pole-corner of the second assembly is aligned with the pole of the first assembly, produces reluctance torque to move the pole of the second assembly, the pole-corner of the second assembly being sequentially increasingly aligned with the pole of the first assembly by subsequent flux loops producing reluctance torque to continue move until the poles of the assemblies are fully aligned.

2. A polyphase reluctance machine as claimed in claim 1 constructed as a non-overlap-pole type wherein for the first magnetic assembly, the pole of the adjacent phase and the pole of the present phase have their respective wound teeth arranged such that, in use, at a pole joint between phases the respective end flux loops of each series of flux loops are in the same rotation direction.

3. A polyphase reluctance machine as claimed in claim 1 constructed as an overlap-pole type such that, in use, the winding poles of the plural phases are in

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part overlapped, the respective series of flux loops of each overlapping pole section are in the same rotation direction.

4. A polyphase reluctance machine as claimed in any of claims 1 to 3 wherein the first magnetic assembly comprises a stator.

5. A polyphase reluctance machine as claimed in any of claims 1 to 3 wherein the first magnetic assembly comprises a rotor.

6. A polyphase reluctance machine as claimed in claim 4 or claim 5 wherein , in use, the windings in each slot are driven by current inversely direction to windings in adjacent slots

7. A polyphase reluctance machine as claimed in claim 4 wherein said windings of the plural teeth of each pole are connected together to be one phase winding, the windings being connected in parallel.

8. A polyphase reluctance machine as claimed in claim 4 wherein said windings of the plural teeth of each pole are connected together to be one phase winding, the windings being connected in series.

9. A polyphase reluctance machine as claimed in claims 7 or 8 wherein every tooth is wound inversely direction to each other adjacent.

10. A polyphase reluctance machine as claimed in claims 7 or 8 wherein only the odd teeth are wound, the teeth being wound in the same direction.

11. A polyphase reluctance machine as claimed in claims 7 or 8 wherein only

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the even teeth are wound and wound in the same direction.

12. A polyphase reluctance machine as claimed in claim 4 or claim 5 wherein said teeth comprise virtual teeth, the position of the winding on the first magnetic assembly being maintained so as to effect, in use, a the virtual tooth for flux travelling between the first assembly pole and the second magnetic assembly pole, the operating air gap being smaller than that required for a corresponding non virtual teeth arrangement..

13. A polyphase reluctance machine as claimed in claim 4 or 5 when dependent from claim 2 comprising a direct current pulse machine having at least two second magnetic assembly poles wherein for a given number of second magnetic assembly poles, number of phases and an even number of teeth per first magnetic assembly pole, the machine parameters including :-

the total number of first magnetic assembly poles equals the number of second magnetic assembly poles time the number of phases; and

the total number of teeth equals the total number of toothed poles times the number of said teeth per pole.

14. A polyphase reluctance machine as claimed in claim 4 or 5 when dependent from claim 2 comprising a direct current pulse machine having an even number of second magnetic assembly poles and at least two teeth per first magnetic assembly pole wherein for a given number of second magnetic assembly poles, number of phases and a number of teeth per pole, the machine parameters including :-

the total number of first magnetic assembly poles equals the number of second magnetic assembly poles time the number of phases; and

the total number of teeth equals the total number of poles times the number

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of teeth per pole

15. A polyphase reluctance machine as claimed in claim 13 or 14 having three phases, the machine parameters including :-

the stroke angle of the machine equals 360 divided by 2/3 of the total number of first magnetic assembly poles.

16. A polyphase reluctance machine as claimed in claim 4 or 5 when dependent from claim 3 comprising a direct current pulse machine having at least two second magnetic assembly poles wherein for a given number of second magnetic assembly poles, number of phases and number of teeth per first magnetic assembly pole, where the number of teeth are in accordance with the overlapping ratio, the machine parameters including :-

the total number of first magnetic assembly poles equals the number of second magnetic assembly poles times the number of phases; and

the number of teeth per pole divided by the number of phases is an integer.

17. A polyphase reluctance machine as claimed in claim 16 having a three phases, the machine parameters including :-

the total number of teeth equal 2/3 of the total number of stator poles times the number of teeth per pole; and

the stroke angle of the machine equals 360 divided by 2/3 of the total number of first magnetic assembly poles.

18. A polyphase reluctance machine as claimed in claim 4 or 5 when dependent from claim 3 comprising an alternating current machine having an even number of second magnetic assembly poles wherein for a given number of second

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magnetic assembly poles, number of phases and number of teeth per first magnetic assembly pole, where the number of teeth are in accordance with the overlapping ratio, the machine parameters including:-

the total number of first magnetic assembly poles equals the number of second magnetic assembly poles time the number of phases; and

the number of teeth per pole divided by the number of phases is an integer, every winding pole having the phase winding inverted with respect to each adjacent pole so as to generate in use the series of flux loops rotation direction in accordance with alternating current to eliminate cancellation of the series of flux loops.

19. A polyphase reluctance machine as claimed in claim 18 having a three phases, the machine parameters including :-

the total number of teeth equals 2/3 of the total number of first magnetic assembly poles times the number of teeth per pole; and

the stroke angle of the machine equal 360 divided by 2/3 of the total number of first magnetic assembly poles.

20. A polyphase reluctance machine as claimed in any of claims 13 to 19 where in order to achieve low torque ripple the winding is optimised to provide for a high number of teeth.

21. A polyphase reluctance machine as claimed in any of claims 13 to 19 comprising a linear motor

22. A polyphase reluctance machine as claimed in claim 4 where the rotor core comprises a light weight material.

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23. A polyphase reluctance machine as claimed in claim 4 where the rotor core is hollowed out.

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